Philosophical Transactions

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concerned in the publication hereof in your Monethly Book; I pray, direct ſuch as ſhall deſire to make any uſe hereof or be further ſatisfied herein, to Mr. *Thomas Raſtell* at the Jerkers Office in the Cuſtome houſe, or to the ſaid Mr. *Raſtell* or Mr. *Francis Dracott* at Mr. *Garrawayes* Coffee-houſe, where they will be found every *Tueſday* and *Thurſday* from eleven to twelve of the clock, and afterwards the ſame dayes in the *Weſt-India-Walk* upon the Exchange. The ſaid Mr. *Raſtell* and Mr. *Dracott* being the perſons imployed by the Parties concerned in the management of this Work, they may receive ſatisfaction from them, that this way of ſheathing is as cheap as the other, much more durable, and in many reſpects more beneficial to the Owners, both in point of charge and advantage in ſayling, then any way of ſheathing hitherto uſed. This is all at preſent from, *Sir*

Weſtminſt. this 7*th.* of *Feb.* 16$\frac{73}{74}$

Your very humble Servant
John Bulteel.

An Account of two Books:

I. *MUSICA SPECULATIVA del* Mengoli, *Dottor dell' una & l'altra Legge, & P.P. de ſcienze Mechaniche nello Studio di Bologna: In Bologna* 1670. *in* 4°.

OF this *Italian* Treatiſe we could give no ſooner notice, becauſe it came but very lately to our hands, though it hath been printed three years ago. The famous Author undertakes to give in it a better account of Muſick and the reaſons of Songs, than has been done hitherto. And whereas among the ſuppoſitions of Muſick it hath been received for an undoubted Axiom, that *Conſonance* is made by the frequent union of two Sounds in ſtriking the *External* Drum of the Ear, (for he pretends there is another Drum) at one and the ſame time; he affirms to have diſcover'd this to be utterly falſe, and maketh it his buſineſs to prove it in the 4th and 17th ſpeculation of this Book. In the making of which Diſcovery he relates to have been aſſiſted by taking an exact view of the *Organ of Hearing* it ſelf; he and his Anatomical friends having there taken particular notice, How the three little bones are faſtned to one another and to the *two Drums*, the External and Internal, (Anatomiſts having hitherto ſpoken but of *one* only,) ly,) and to the little Cavern and the mouth thereof; and how they were able to guide the threds through the paſſage of that cavern. And having carefully obſerved all theſe parts, both as they were Joyned together in their reſpective places, and ſeparate, one by one; he tells us, that then he ſet upon writing theſe Speculations. In which he gives us in the firſt place his *Natural Hiſtory of Muſick*, which being the ground of the whole work, we think it will not be unacceptable to the Reader, to find it here entirely *Engliſhed*; eſpecially ſince the Book it ſelf is yet very ſcarce in *England*, the commerce between our and the Italian Stationers being very ſlow, if there be any at all. But before I here deliver this Hiſtory, I find my ſelf obliged to take notice, that it, as well as divers other parts of this Treatiſe, are ſomewhat obſcurely written; which the Reader of the Book it ſelf, though he be well verſed *both* in the Language wherein 'tis written, *and* in the Argument, will find to be ſo, whenever he ſhall have opportunity and leiſure to read it: This being premiſed, the Hiſtory it ſelf follows.

The Natural Hiſtory of Muſick.

A Sound begins from the colliſion of two parts of the Air, which parting from one another, make a vacuity as to Air, in which *vacuum* two other parcels of Air do meet and knock one another: And becauſe the two firſt parcels of Air do incline to return to the center of the colliſion, but cannot, becauſe the room is taken up, they do part from the center by lines curled and as 'twere recurring to their firſt place, in the doing of which they make a colliſion with thoſe parts of the Air that have poſſeſſed themſelves of *their* room. And thus the *ſpecies* of the Sound is multiplied and extended.

Theſe curled lines are more waving *near* the center of the colliſion, as being more ſtretch't long-ways than ſpirally, and leſs waving when they are further off from the center; in which latter lines, the inclination to return towards the center is prevalent above the impetus of receding from it; ſo that at laſt they turn back towards the center. Thus of the *ſpecies* of a Sound there is filled a ſphere of Air, or ſuch a part of a ſphere of it, as this motion of the Air can without impediment ſpread it ſelf through.

In like manner *two* Sounds,from *two* centers,one within the ſonorous ſphere of the other, do begin and are diſtributed through the ſmall particles of the Air, in ſuch a manner, *that* ſome of the pulſes are affected by one ſound,and others,without confuſion, by the other, and *that* the pulſes of the acuter ſound are ſwifter and do compleat their curlings in a ſhorter time,and the pulſes of the graver ſound in a longer.

The *Aura* or ſubtile matter, in which theſe motions of the Air are made,according to its incomparable ſubtlety,and that property which it hath of being altogether indifferent to any condition of bodies, and ſuted exactly to repreſent any motion, or ſtamp, or weight of other bodies, among which 'tis found; this *Aura*,I ſay,doth ſecond, and not at all impede the two motions produced by thoſe two ſorts of pulſes, being moved with all the innumerable intermediat motions. There may alſo more ſounds than two be diſtributed through the particles of Air,yet not without ſome confuſion.And the more Sounds there are, the more confuſed will the diſtribution of the pulſes be, eſpecially near the centers themſelves, whence the Sounds begin.

The *Ear* is an Organ, by which a man placed in a ſonorous Sphere perceives ſound, conſonancy, and ſongs. This organ hath three parts; the *exterior*, which is without the Cavity of the Ear, and viſibly extant on the head; the *middle-moſt*, which is the Cavity it ſelf; and the *innermoſt*, which being within the Cavity, is a ſtony bone of the form of a ſpunge, in which is a cavern, recurring to the hollow part of the Ear, and ſhaped like a knot of ribonds (*ital. naſtro:*) And in all the holes of this ſpungy-like bone there are found webs ſtretch't out, that encloſe the Air congenit or implanted.

The *Middle* part is cloſed up by *two* membranes, called *Drums*, ſtretcht over the cavity of the Ear. And of theſe two, the one is *external*, at the bottom of the exterior part of the Ear; and the other *internal*, upon the mouth of the cavern. And between theſe Drums there are three ſmall bones, tied to one another, and to the drums, and faſtned in two points to the ſides of the cavity, and movable, ſo that if the outward Drum does ſhake, the inward muſt ſhake alſo, and that twice as often.

The inclination of theſe two Drums is to move in a proportion to the double*; but the exigency of the inſtrument makes them move differently from their inclination: So that this is the ſenſitive Organ, in which the Soul is to take notice of what is there acted.

Between the two drums there is no *Air* properly ſo called,* but only an *Aura*, which ſeconding the inclinations of the drums to motion, and the motions themſelves, preſerves all the intermediat inclinations and motions. And the reaſonable Soul, permanent in its nature, placed in the flitting Body as the Form thereof, hath this natural property, to make what is temporal permanent, that is to ſay, to ſtay Time in her ſelf, and to collect all the times of the intermediate inclinations and motions, which are in the *Aura*; in the doing of which, ſhe abſtracts from matter two things that are demonſtrated to be proportional, as the logarithmes, of the two *Ration*'s; one of the drums Inclinations to motion, and the other of the drums motions themſelves. Whence the Soul in hearing hath alwayes ready the two *Ration's*, double in act, and half of the double in * inclination; of which ſhe makes uſe for meaſures to apprehend all the rations of Sounds.

If the Ear be within a Sonorous Sphere, the particles of the Air affected by the ſound do enter at the external part of the Ear, one after the other, and all paſs in order, through the ſpiral wayes that are there, to the bottom of the Ear, where every one ſtrikes the drum, and after that, by other ſpiral wayes, iſſue out of the Ear again, and ſo give place to other particles of air, that ſucceed to do the ſame.

The external drum being ſtruck once, ſhakes frequently; and, by means of the three little bones, the internal drum anſwers to it in a double frequency; and the *aura*, in the cavern of the cavern of the internal part of the Ear,alternately goes and comes through its knot-like paſſage , and ſpreads it ſelf through the other wayes of the ſpungy-like bone, and being repercuſſed to the webs that cloſe it, rebounds and multiplys the ſound. An other parcel of Air follows, and ſtrikes the drum again, and cauſeth the ſhaking as before.

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* (Ital. *In proportione dimidiata della doppia.*)

* Though the Author will admit of no Air commonly ſo called between the Drums; yet he admits of ſuch Air in the Cavern, and within the *os Petroſum*, the inward part of the Ear; becauſe the Drums would have no motion at all, if there were nothing but *Aura*, for as much as this *aura*, though it may be mov'd by any other thing, yet it cannot be a means to convey motion from one body to another. It is, *ſaith he*, the internal inſtrument of the Mover, that lodges there *within*, but not of any Mover that is *without*. See *pag.* 15.

*(*Doppia in atto, & dimidiata della doppia,*)

But if the Ear be within two Sonorous Spheres, the affected pulſes that cauſe the ſound , do ſucceed the one amidſt the other, by turns, to ſtrike the outward drum; and by the exigences of the alternations , the ration's that are not expreſſible by numbers become to be ſo,and that *both* of ſuch numbers,as can be diſtributed amongſt the particles of the Air,*and* of ſuch alternations,as that amongſt the ſtrooks, the ſhakings of the drum may be all numbred.And the ſoul perceives the numbers of theſe alternations, and the numbers of the ſhakings of the drum amidſt the ſtrokes of the two ſounds: And whilſt the *aura* that is affected by the two ſounding bodies , does communicate with the *aura* between the drums,ſhe there takes alſo notice of the Logarithme of the *ration* of ſounds , and commenſurates it with the Logarithmes of the *ration's*, the double, and its half.

Now, for as much as the Soul pleaſeth her ſelf with two ſounds together, and with the ſucceſſion of many ſounds one after an other,that occur in one Song,'tis neceſſary ſhe ſhould comprehend in the *Senſe* theſe three things which ſhe perceives, without any abſtraction of the *Mind*. The numbers of the alternation muſt needs be eaſy to make , and two in one ſole numeration. The commenſuration of the Logarithmes muſt be made by the way of an eaſy diviſion into parts, and into a number of parts eaſy to be numbred.

And becauſe it is not poſſible preciſely to accord theſe two things equally,ſome errours muſt needs happen,which may be all perceived by *Reaſon*, but cannot all be alike taken notice of by *Senſe*: Some are inſenſible,ſome altogether intolerable and abſurd, others between both; and of theſe,ſome are nearer to the inſenſible ones ; others, to thoſe that are intolerable: Of which errors, convenient eſtimates are given, and according to the differences of thoſe errors the *ration's* of ſounds are diſtinguiſh't.

Laſtly, becauſe it is not poſſible equally to adjuſt theſe two things with the numbers of the ſhakings of the drum; 'tis neceſſary, that the ſoul, deſirous of the delight, in the earneſt attention to the ſound do invigorate her ſelf, and be buſy and intent about the outward drum, drawing and reſtoring it from time to time, more or leſs; that ſo the numbers of its ſhakings may anſwer to the alternations of the touches, and to the logarithms of the moſt eaſy numbers and parts that's poſſible : In the doing of which, ſhe learns the Tune which ſhe hears, and keeps it within her, and is glad to find herſelf moved by various affections, ſometimes to ſtretch the drum, ſometimes to relax it, otherwhile to leave it in its natural tenſion, with a certain order, and for certain caſes of the ſound, which in the Tune do occur to her.

So far his Hiſtory of Muſick; which being premiſed by him, he gives us a very particular and minute Deſcription of the *Ear*, of *Sound*, and of *Hearing*, eſpecially of the Hearing of two ſounds together; where occur many *Theoremes*, by him laid down as the chief Foundation of his whole work. Which done, he treats of all ſorts of *Muſical Intervals*, their perfection and Meaſure; explicating this doctrine alſo by many *Theorems*, and giving withal the Definitions of the ſeveral Intervals, and taking particular notice of ſix ſorts of them, for which having found no names, he thought fit to borrow names for them from *Colors*.

Next, he diſcourſes at large of the *True Numbers* of Sounds, and of the various properties thence reſulting for Muſical Intervals; all which he likewiſe elucidates with divers conſiderable Theorems; ſhewing withal, between what true numbers of Sounds the *Species* of each Interval is moſt perfect; and teaching, that the rational Soul by her active and earneſt attention gives the *true* number to the *firſt* Sound, that in the Ear is exhibited to her.

Further, he treats of Muſical *Chords*; then of *Singing*, and the *Modulation* or Tune; which latter he diſtinguiſhes from Singing in general, by this, That it is ſuch a kind of Song, as impreſſes it ſo ſtrongly upon the Soul, as to incline her to ſing it over and over again. Here, by the help of a *Table*, he ſhews to have compoſed in order all the *Species* of poſſible Modulations or

Tunes in every Tetrachord, and reduced them alſo to a Table.

Beſides this, he diſcourſes amply of the *Accord of more* pag. 190. *Sounds*, and of *Harmonical Proportionality*; as alſo of the *Paſſions* of the Soul; how they are concern'd in and wrought upon by Muſick, giving us a *Table* of the ſeveral MuſicalChordes ſuited to the ſeveral Affections. He concludes the whole with a large diſcourſe of the Modern, both Church and other, Muſick,

Now, whether this Author have by all theſe his Speculations and pains given a perfect *Scale of Muſick*, according to the true Proportions of Sounds, (which is the great *deſideratum* in Muſick,) we muſt leave to the judgement of the great Maſters of Muſick, eſpecially to the judicious and extraordinarily skilful Muſitian Mr. *John Birchenſha*; who, it is ſtill hoped, if he be competently encourag'd and aſſiſted, will in due time publiſh to the world a Compleat Syſtem of Muſick, after the method formerly taken notice of in theſe *Tracts, Numb.* 90. p. 5153.

II. Georgii Wedelii *M. D. Specimen Experimenti Novi, de Sale Volatili Plantarum*, Francofurti, 1672. *in* 12°.

THis Author endeavors to ſhew in this *Tract*, that by a peculiar way there may be drawn out of Plants a true and genuine *Volatil* Salt; aſſerting, that there is not only in Cephalick, Anti-ſcorbutick, *&c.* but alſo in thoſe Plants that are inſipid and accounted cold, a volatil Salt lurking. And this he offers to prove;

Firſt, by the food of Animals, that live altogether upon Graſs, and ſuch like herbs, and do abound in Volatil Salt; which he pretends is not made ſuch by digeſtion, ſince to him it is not imaginable, that the Heat of Animals, or the Ferment of their innate Volatil Salt, is ſo multiplicative, as to diffuſe and extend it ſelf ſo far, as to prepare this Salt, and that ſo copiouſly out of Herbs ſuppoſed to have none ſuch.

Secondly, Chymiſts are granted to draw hot Spirits out of cold: Why then ſhould they not afford Volatil Salts, ſince ardent Spirits are akin to them?

Thirdly, the ſmoak and ſoot of herbs and wood punge the eye: Whence that but from a volatile Spirit?

Fourthly,

Fourthly, Wine abounds in Volatil Salt, and out of its *feces* ſuch Salt is extracted.

Fifthly, Bread as ſoon as 'tis in the ſtomach, refreſhes and recovers the faint, before any Chyle or blood is made of it; and even the ſteam of bread in the Oven is reſtorative. Whence elſe, but that the Volatil Salts, which are ſubtile and exceeding active and piercing, are darted into the Nerves, Veins and Arteries, and thereby ſuddenly relieve the indigent body?

Sixthly, he affirms to have obtained fine cryſtals out of *Quinces*, *Opium*, *&c.* which he can deduce from no other principle than that of Volatil Salt.

Seventhly, he ſaith, that he hath *actually* drawn from a certain herb a very fine Volatile Armoniacal Salt, without any additament that could be as much as ſuſpected to participate in the leaſt of any ſuch Salt; and that he hath performed this without fire.

This done, he relates the ſeveral wayes uſed by others to draw Volatil Salt out of Plants; and on this occaſion diſtinguiſhes two ſorts of *Fermentation*, the one *deſtructive*, whereby the Form of the mixed bodies periſhes, and which tends to Corruption; the other *Elicitive*, whereby parts latent are brought to light, and are extricated from the bonds that kept them impriſoned. And by this latter way he ſaith that the Volatil ſaline parts may be ſet at liberty and made to fly away.

And having declared, that by means of an Artificial fermentation Volatil Salt may be obtained out of Plants, more or leſs; he giveth this general direction about it, that they muſt be bruiſed, digeſted, and in due time (which is chiefly in the Spring) their Volatil Salt collected; referring particulars to a time, when he ſhall have verified this Experiment in more Plants, than he hath yet done.

To all this, he annexes the great Uſe of Volatil Salts extracted out of Plants, eſpecially in almoſt all Diſeaſes, for as much as they are able to diſ-obſtruct the pores of the Brain; diſcuſſe Lethargies and Apoplexies; afford to the Spirits a free paſſage through the nerves; recover faintings; remove hypochondriacal and hyſterical ſuffocations; attenuate the blood; paſs into the inmoſt receſſes of the bowels, and open all obſtructions there; depurate the blood, and what not?

He concludes the whole with four Chapters, whereof the *firſt* treats of the Pores and Figures of Volatil Salts, correſponding to thoſe of the Brain, Heart, Blood, Nerves: The *ſecond* compares Volatil Salt with Quickſilver, which he takes to be nothing elſe but a Volatil Salt: The *third* examins, whether Volatil Salts are contained in Mixts *actually* or *potentially*: The *fourth* inquireth, whether all Volatil Salts are of the ſame kind.

So much of this Author; whoſe way not being here made out and declared, we hope, a Learned and very knowing Member of the *R. Society*, Doctor *Daniel Coxe*, will ſhortly ſupply the world with that defect, he being certainly and experimentally maſter of a ſure and eaſy way of extracting the Volatil Salt out of all ſorts of Plants.

An Advertiſement.

HEaring of great complaints of the *Rot* of Sheep in many parts of *England*; we thought, it would not be unwelcome to the Reader, to be, on ſuch an occaſion, directed, for a good and cheap way of preventing the diſeaſe, to what the Honourable *Robert Boyle* hath publiſht in his ſecond *Tome* of the *Uſefulneſs of Natural Philoſophy*, printed at *Oxford A.* 1671. *p.* 15. The ſhort whereof is; That a great Sheepmaſter lately preſerv'd his Flocks in a moiſt Country, when moſt of his neighbours loſt theirs; and that he did it by the bare uſe of (*Spaniſh*) Salt, of which each Sheep, being firſt made to bleed a little under the Eye, was made to take down a ſmall handful, two or three times (with ſome days of interval,) without being ſuffer'd for ſome hours to drink any thing after it.

LONDON,
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